



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,888	12/03/2004	Paul Alexander De Vries	APV31832	1674

24257 7590 07/18/2007
STEVENS DAVIS MILLER & MOSHER, LLP
1615 L STREET, NW
SUITE 850
WASHINGTON, DC 20036

EXAMINER

MCNELIS, KATHLEEN A

ART UNIT	PAPER NUMBER
----------	--------------

1742

MAIL DATE	DELIVERY MODE
-----------	---------------

07/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/516,888	Applicant(s) DE VRIES ET AL.	
	Examiner Kathleen A. McNelis	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12/03/04, 12/29/04</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1742

Claims Status

Claims 1-15 are presented for examination wherein claims 1-12 are amended and claims 13-15 are new.

DETAILED ACTION

Claim Objections

Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 11 and 12 rejected under 35 U.S.C. 102(b) as anticipated or under 35 U.S.C. 103(a) as being unpatentable over Japanese patent document 07-070666 (JP '666)¹.

With respect to claims 1, 11 and 12, JP '666 discloses a method and apparatus for continuous refining of aluminum scrap comprising an Fe-removing process of crystallization-separating Al-Si-Fe-Mn from aluminum by crystallization and a refining process to produce hypoeutectic Al-Si with low Fe content (JP '666 claim 1) where the Al-Si-Fe-Mn compounds are crystallized and removed by suction (JP '666 claim 2) and the hypoeutectic alloy is solidified and removed along the horizontal direction (JP '666 claim 3). JP '666 discloses a fractional crystallization process, where the Fe-removing process (p. 6) fractionally crystallizes Al-Si-Fe-Mn compounds and is in series with three refining steps (pp. 6-7) each of which fractionally crystallizes the hypoeutectic Al-Si alloy as shown on Figure 1. As depicted in Figure 1, the compartments (9), (2), (3) and (4) are in series communication. As depicted in Figure 3, at least some of the crystals (crystallized intermetallic compounds C2) are removed in a direction perpendicular to the remaining melt (M3).

¹ Based on English translation.

Alternatively, although JP '666 does not specifically recite that the molten metal is transported in a direction "opposite" that of the crystals, the configuration would be a matter of choice which a person of ordinary skill in the art would have found obvious lacking evidence that the particular configuration of "opposite" direction is significant (see M.P.E.P. 2144.04).

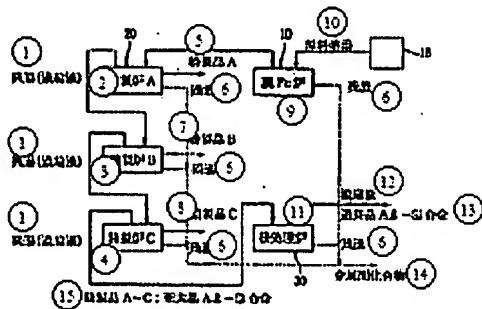
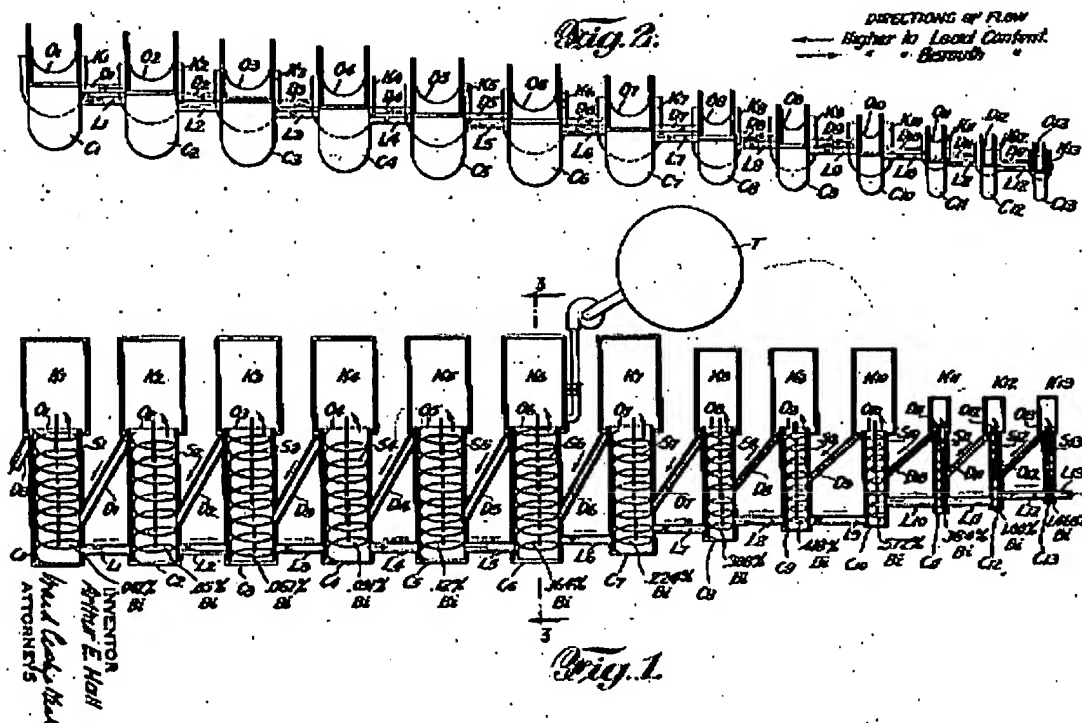


Figure 1

- Key:
- 1 remaining melt (concentrated liquid)
 - 2 refining furnace A
 - 3 refining furnace B
 - 4 refining furnace C
 - 5 refined product A
 - 6 residue
 - 7 refined product B
 - 8 refined product C
 - 9 Fe-removing furnace
 - 10 raw material melt
 - 11 post-treatment furnace
 - 12 concentrated liquid
 - 13 hypereutectic Al-Si alloy
 - 14 intermetallic compounds
 - 15 hypoeutectic Al-Si alloy

Claims 1-10, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hall (U.S. Pat. No. 1,938,101) in view of Perry's Chemical Engineers' Handbook (Perry's Handbook).

With respect to claim 1, Hall discloses a metal refining process for removal of other metals from lead (p. 1 lines 1-4). The process consists of a series of crystallizers (C1 – C13), which are in communication via lauders (L1 – L12) as shown in Fig. 2:



The liquid level in each crystallizer is determined by at least as a lower level at the bottom of the crystallizer and an upper level set at the predetermined heights to permit the transport of the melt via difference in difference in head in each crystallizer and the next crystallizer in series (p. 2 lines 104-127). The crystals are removed from each crystallizer compartment by screws S1 to S13 (p. 2 lines 129-133) whereas the liquid is removed to the next crystallizer in series via lauders (p. 2 lines 104-127). Although Hall does not teach that the directions of flow are “opposite” (Hall depicts flow at about 90 ° for screws and lauders in Fig.1), the configuration would be a matter of choice which a person of ordinary skill in the art would have found obvious lacking evidence that the particular configuration of “opposite” direction is significant (see M.P.E.P. 2144.04). Further,

Art Unit: 1742

the removed crystals are transferred to kettles K1 to K12 where they are melted and moved via open ducts D1-D13 to the upstream crystallizer as shown in Figure 1, therefore the direction of flow of remelted crystals (via D1-D13) is opposite that of the metal layer (via L1-L12) as depicted in Fig. 2.

While Hall does not specifically recite that the compartments are stirred, Hall recites that the crystals and molten mass is kept agitated (p. 7 lines 9-17).

Perry's Handbook teaches stirring as the means for providing agitation of liquid-solid processes (pp. 18-5 to 18-13), therefore the use of a mixer (i.e. stirring) as taught by Perry's Handbook would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the agitation desired in Hall.

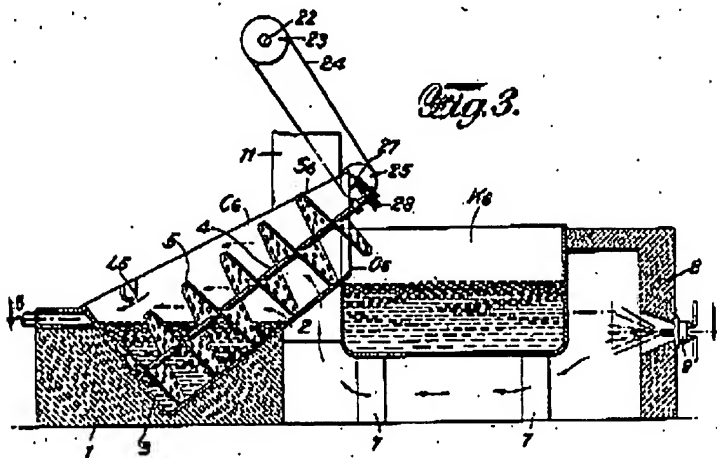
With respect to claim 2, Hall discloses an example where three crystallizers C1, C2 and C3 were used to separate lead from antimony. The temperatures in the crystallizers were maintained at about 265 °C in C1, 255 °C in C2 and 248 °C in C1. The molten lead moved in a direction of decreasing temperature due to the height differences in the crystallizers, whereas the collected crystals were moved via ducts from crystallizers with lower temperatures to those having higher temperatures (p. 4 line 120 – p. 5 line 114).

With respect to claims 3, 4 and 13, each crystallizer has walls as shown in Fig. 1, therefore movement from one crystallizer to the next is through a "pair" of walls. Further, the walls extend from at least the upper surface of the metal to the lower surface of the metal in order to contain the metal.

With respect to claim 5, Hall discloses that at least some liquid is collected by the screw (e.g. S6 in Fig. 3) while the screw is transporting crystals and that such liquid drains back through perforations (5) into the crystallizer (p. 3 lines 24-63). This liquid can be broadly interpreted in

Art Unit: 1742

view of the claim limitations as a “transporting liquid”, since it is collected by the screw and transported at least part of the distance above the crystallizer with the formed crystals. The walls depicted in Figure 3 (e.g. lower end wall (3) and bottom (2)) extend towards and adjacent to the layer of transporting liquid. Further, lacking further limitations on “layer” such liquid would be expected to form at least a partial layer on screw helix portion prior to reaching a drain hole (5).



With respect to claims 6 and 7, Hall discloses that the crystallizers were arranged at an angle of 30° from horizontal (p. 4 lines 145-150 and Fig. 4), therefore the chamber would have an inclined bottom. The walls would be expected to extend from at least the upper surface of the melt to the lower surface of the melt in order to contain the melt. Fig. 3 shows that the bottom (2) of the wall confining the screw (S6) is inclined and extends at least as far as the discharge to the kettle (K6).

With respect to claims 8 and 15, although Hall does not disclose that the walls are adjustable, making walls adjustable would not be a patentable advance in view of the criticality of heights in each crystallizer to achieve the head differential required for flow as disclosed by Hall (see M.P.E.P. 2144.04 V). Such modification would have been obvious by means suggested in

Art Unit: 1742

Hall, e.g. by adjusting the height of a crystallizer relative to other crystallizers in series (p. 2 lines 104-127).

With respect to claim 9, Hall recites that the crystals and molten mass are kept agitated (p. 7 lines 9-17), therefore stirring would have been obvious to one of ordinary skill in the art at the time the invention was made as a means to provide the desired agitation as discussed above regarding claim 1.

Perry's Handbook teaches that mixing speed (i.e. velocity) is a variable which affects performance characteristics such as mixing time and power consumption (pp. 18-5 to 18-13), therefore optimization by variation of mixing speed in the process of Hall would have been obvious to one of ordinary skill in the art at the time the invention was made (see M.P.E.P 2144.05, II, B).

With respect to claim 10, Hall discloses removal of molten metal from D13 of crystals melted in kettle K1 (p. 5 lines 56-73).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese patent document 07-070666 (JP '666) in view of Perry's Chemical Engineers' Handbook (Perry's Handbook).

JP '666 is applied as discussed above regarding claim 1.

JP '666 discloses mixing means as shown in Figures 2 and 3 and discussed above regarding claim 1.

JP '666 does not recite that mixing velocity is controlled as a variable.

Perry's Handbook teaches that mixing speed (i.e. velocity) is a variable which affects performance characteristics such as mixing time and power consumption (pp. 18-5 to 18-13), therefore optimization by variation of mixing speed in the process of JP '666 would have been

Art Unit: 1742

obvious to one of ordinary skill in the art at the time the invention was made (see M.P.E.P 2144.05, II, B).

Allowable Subject Matter

Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Japanese patent document 07-070666 (JP '666) or Hall in view of Perry's Handbook do not disclose or suggest a method of fractional crystallization in which a layer of molten salt transporting liquid is present below and/or above a layer of metal in a method for fractional crystallization of a at most partially solidified molten metal, divided into a series of compartments communicating with each other wherein the metal is stirred in at least some of the compartments and crystals are selectively transported in a predetermined direction and molten metal is selectively transported in the opposite direction.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

Art Unit: 1742

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM

07/12/2007

KAM

R
ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700